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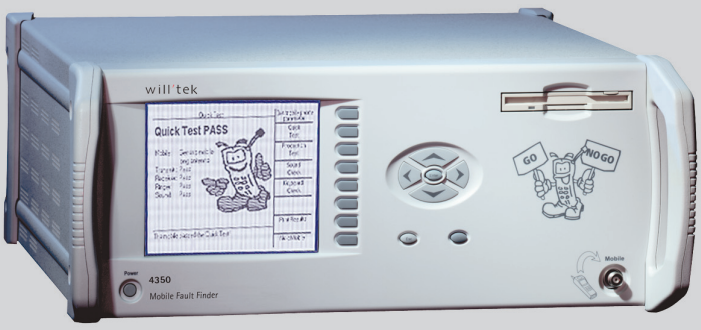
Willtek 4350

Mobile Fault Finder



- Enables rapid filter testing for AMPS, NAMPS, CDMA2000 and TDMA mobile handsets
- Provides instant problem analysis with one-touch automatic testing
- Delivers speedy, affordable performance testing and reduces training time
- Simplifies operation with its animated graphical user interface, complete summary screens and exportable results
- Simulates real network conditions for complete testing
- Adapts to your needs through the provision of five models with firmware upgrades that keep pace with technology and standards developments

The 4350 Willtek Mobile Fault Finder series is especially designed for service organizations that need to assess and repair mobile phones at the point of sale. This easy-to-use test instrument enables rapid on-the-spot testing, enabling wireless network operators to eliminate the costs of repairing and replacing phones unnecessarily.
Non-technical users can conduct the same in-depth test as service technicians and accurately pass or fail a handset – all at the touch of a button. The 4350 series also provides comprehensive testing for the most popular mobile phone transmission technologies, including AMPS, NAMPS, CDMA2000 and TDMA, in an easy-to-use instrument.

Provides optimal ease of use

The 4350 series features a friendly animated graphical user interface that helps users learn faster and perform tests quicker. A Rapid Start Users' Guide minimizes the need for formal training and allows users to start using the instrument almost immediately. With its simple, automated test procedures, the 4350 allows moderately trained service users to perform the same full in-depth mobile phone test as skilled service technicians.
The instrument's large display clearly presents operator instructions for easy viewing and use, while its small footprint requires minimal bench space.

Enables rapid testing of multiple standards

Willtek's innovative 4350 series enables point-of-sales and service users to assess faults in AMPS, NAMPS, CDMA2000 or TDMA mobile handsets.
Companies can choose from five models, each delivering accurate RF measurements to test modern, feature-rich mobile phones.

Choose the Willtek instrument for your testing needs

4351 Mobile Fault Finder	AMPS, NAMPS
4352 Mobile Fault Finder	AMPS, NAMPS, CDMA2000 (800 MHz)
4353 Mobile Fault Finder	AMPS, NAMPS, CDMA2000, PCS (800 MHz, 1900 MHz)
4354 Mobile Fault Finder	AMPS, NAMPS, TDMA (800 MHz)
4355 Mobile Fault Finder	AMPS, NAMPS TDMA, PCS (800 MHz, 1900 MHz)

Provides instant problem analysis

Willtek's 4350 series allow your users to focus on the returns that are really defective. The 4350 series provides instant and accurate PASS or FAIL results using the QuickTest function. All the necessary parameters and functions of the mobile are tested, providing the customer with an efficient and professional service. No longer must you ship phones to repair centers and back to the customer needlessly. In addition, the test report can be printed out and given to the customer as an objective assessment of the handset's status.

Simplifies operation

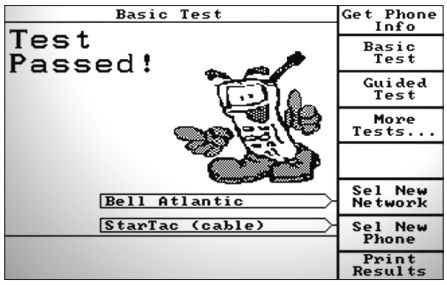
Operation of the 4350 series is simplified and made even more cost-effective by the addition of numerous time and effort saving features. For example, the 4350 is designed so your users can store up to 20 mobile phones' settings and 10 independent networks.
Management of the test data is made easy with the 4350 series thanks to its ability to export data to a standard Windows PC for analysis via floppy disk or to send data directly to a parallel printer.

Simulates real network conditions

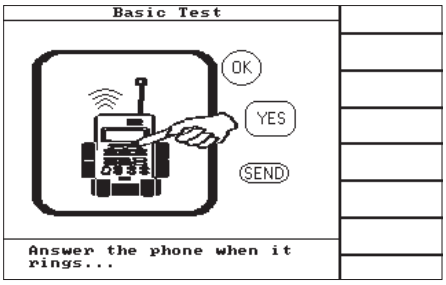
Willtek recognizes that test bench conditions are not the same as real life network conditions. As a result, the 4350 series is designed to simulate authentic network conditions. During the testing, all of the parameters and functions of a mobile handset are thoroughly checked as if it were in operation. As a result your users can distinguish user errors, faulty batteries or network coverage problems from genuinely defective handsets.

Adapts to your needs

As the leading vendor of mobile test equipment, Willtek understands its customers' evolving needs. As a result the 4350 series has been designed with flexibility and market growth in mind.
All of the models in the series allow you to carry out custom tests and specifications tables for testing flexibility. As standards advance, free firmware upgrades are also available on the Internet or via e-mail.
Network and mobile information can be updated via the built-in floppy disk.
The 4350 series caters for the variety of mobile handsets on the market and offers a wide range of RF connectors.
The Willtek RF Shield Box and Willtek Universal Antenna Coupler provides simple coupling for all mobile phone types eliminating the need for additional adapters.



Result screen after each test shows whether the phone passed or failed



User-friendly instructions guide you through the test

Specifications

Basic RF data

Input/output impedance	50 Ω
VSWR	< 1.30 (900 MHz)
	< 1.80 (1900 MHz)
RF input/output	TNC-type, female
Internal reference frequency	10 MHz
Temperature stability	0.2 x 10^{-6}
	(0°C to +50°C)
Aging	10^{-6} per year
External reference input	BNC-type, female
External reference frequency	10 MHz

System functions

AMPS/NAMPS (4351, 4352, 4353, 4354, 4355)

Signaling	Mobile registration
	MS call (mobile-originated)
	BS call (page mobile)
	MS and BS release
	Handoff
	Alert and flash with info
	Authentication
	SSD update
	MS hookflash with info
	Message waiting
Measurements	Analog BER
	Mobile TX power (MAC)
	Frequency error
	SAT, ST, DSAT, DST deviation
	SAT, ST frequency measurement
	ST duration
	Audio deviation
	Wideband deviation
	Residual deviation
	Receiver distortion
	Receiver sensitivity

RF Generator

Frequency

Range	869 MHz to 894 MHz
Resolution	0.01 MHz (NAMPS)
	0.03 MHz (AMPS)
Accuracy	same as reference frequency

Output level

Range	–23 dBm to –125 dBm
Resolution	0.1 dB
Accuracy	±0.75 dB ±0.003 dB/dB
	(from –30 dBm to –120 dBm at +25°C)
	±2.0 dB ±0.003 dB/dB
	(from –30 dBm to –120 dBm at +10°C to +40°C)

Modulation

Type	frequency modulation
Frequency range	50 Hz to 12 kHz
Deviation range	0 Hz to 12 kHz
Deviation accuracy	±5%
	(from 300 Hz to 12 kHz + FM residuals)

RF Analyzer

Frequency

Range	824 MHz to 849 MHz
Resolution	0.01 MHz (NAMPS)
	0.03 MHz (AMPS)
Accuracy	±10 Hz
	(plus accuracy of the reference frequency)

Level

Range	–20 dBm to +40 dBm
Resolution	0.1 dB
Accuracy	±0.65 dB ±0.003 dB/dB
	(from +40 dBm to –20 dBm at +25°C)
	±1.2 dB (at +10°C to +40°C)

Frequency counter (RF)

Range	±30 kHz from channel frequency
Resolution	0.01 kHz
Accuracy	±10 Hz
	(plus accuracy of the reference frequency)
Sensitivity	–20 dBm typical

Modulation measurement

Type	Frequency modulation
Frequency range	50 Hz to 12 kHz
Deviation range	0 Hz to 21.585 kHz
Deviation accuracy	±5% (from 300 Hz to
	12 kHz rates + FM residual)
Residual FM and noise	< 50 Hz rms
	(0.3 to 3 kHz)

Frequency counter (SAT, ST)

Range	±20 kHz
Resolution	0.001 kHz
Accuracy	±0.001 kHz
	+ accuracy of the reference frequency

CDMA (4352, 4353)

Signaling	Mobile registration
	MS call (mobile originated)
	BS call (page mobile)
	MS and BS release
Other:	authentication, message waiting, caller ID
	Intraband hard handoff
	Interband hard handoff
	Handoff to AMPS/NAMPS
	Sector (softer) handoff
Speech encoding:	loopback,
	canned speech, silent, normal
	Audio tones, audio chirp
Transmitter measurements	Average power
	Access probe power
	Maximum/Minimum power
	Closed loop power
	Gated output power
	Composite (multicode) waveform quality (rho)
	Waveform quality (rho)
	Code domain power
	Code domain time and phase offsets
	Open loop power accuracy
	Time response of open loop power control
Receiver measurements	Frame error rate (FER)
	Receiver sensitivity
	Receiver dynamic range
	Demodulation with AWGN
	Mobile reported FER
	Mobile reported pilot strength

RF generator

Frequency

Cellular	869 MHz to 894 MHz (4352,4353)
US PCS	1930 MHz to1990 MHz (4353)
Korean PCS	1805 MHz to1870 MHz (4353)
Resolution	10 kHz
Accuracy	same as reference frequency

Amplitude

Level	–23 dBm to –125 dBm
Resolution	0.1 dB
Accuracy	±0.75 dB ±0.003 dB/dB
	below –30 dBm at +25°C, from –30 to –120 dBm
	±2.0 dB ±0.003 dB/dB below –30 dBm,
	from +10°C to +40°C, from –30 to –120 dBm

AWGN

Range	+5 to –10 dB
	relative to CDMA channel power
Resolution	0.1 dB
Accuracy	±1 dB

CDMA modulation

Type	QPSK
Residual rho	> 0.97
Carrier feed through	< –30 dBc

CDMA channels

Sector A	
F-Pilot	Walsh code 0
F-Sync	Walsh code 32
F-Paging	Walsh code 1
F-QPCH	Walsh code 80
F-FCH	selectable Walsh codes 2-64
F-OCNS	fixed to upper three Walsh codes
Sector B (utilized in softer handoff)	
F-Pilot	Walsh code 0
F-FCH	selectable Walsh codes 2-63
F-OCNS	fixed to Walsh Code 64

RF analyzer

Frequency

Cellular	824 MHz to 849 MHz (4352,4353)
US PCS	1850 MHz to1910 MHz (4303)
Korean PCS	1715 MHz to1780 MHz (4303)
Resolution	10 kHz
Accuracy	±10 Hz relative to OCXO time base

Power range

Max input	+40 dBm
Measurement range	–60 dBm to +40 dBm
Accuracy	±0.65 dB ±0.003 dB/dB at +25°C
	±1.2 dB +10°C to +40°C

Waveform quality rho

Range	0.90 to 1.0
Accuracy	±0.003
Timing measurement accuracy	±60 ns

Call processing

Protocols supported	IS95A, IS98D, IS2000 P_REV6, JSTD-008, TSB74
Base station parameters	NID, SID, MCC, MNC F-QPCH state, F-PCH relative level, and reverse link traffic pilot gain
Access parameters	nominal power, initial power, power step, probe steps, response sequences request sequences, preamble length, timeout
Registration support	timer-based, power up, power down, zone, distance, ordered implicit (origination), parameter change
Service options	Support for RC 1-5 SO1-9.6 kbps voice echo SO2-9.6 kbps data loopback SO3-9.6 kbps EVRC voice SO9-14.4 kbps data loopback SO17-14.4 kbps voice echo SO55-RC 3, 4 and 5 data loopback SO32-test data service option (RC3 and 4) SO32768-14.4 kbps voice echo
Reverse link closed loop power control modes	active, alternating, all up, all down

TDMA (4354, 4355)

Signaling	Mobile registration MS call (mobile-originated) BS call (page mobile) MS and BS release Handoff Alert and flash with info Authentication SSD update MS hookflash with info Short message system Message waiting
Measurements	Digital BER BER reporting (MAHO BER) RSSI binary/nominal (dB) MAHO RSSI binary/nominal (dB) 2nd carrier RSSI Normal, loopback, receiver, silent audio Droop RMS and PEAK EVM (error vector magnitude) RMS and PEAK magnitude error RMS and PEAK phase error Origin offset EVM normalized over 10 bursts Mobile TX power (MAC) Frequency error Time alignment Acquisition time Receiver sensitivity Reverse RO

RF Generator (TDMA)

Frequency

Range	869 MHz to 894 MHz (4354, 4355) 1930 MHz to 1990 MHz (4355)
Resolution	0.03 MHz
Accuracy	same as reference frequency

Output level

Range	–23 dBm to –125 dBm
Resolution	0.1 dB
Accuracy	±0.75 dB ±0.003 dB/dB (from –30 dBm to –120 dBm at +25°C) ±2.0 dB ±0.003 dB/dB (from –30 dBm to –120 dBm at +10°C to +40°C)

Modulation

Type	π/4 DQPSK α = 0.35
RMS vector error	< 6%

RF Analyzer

Frequency

Range	824 MHz to 849 MHz (4354, 4355) (within ±500 Hz from channel center) 1850 MHz to 1910 MHz (4355) (within ±500 Hz from channel center)
Resolution	1 Hz (within ±500 Hz from channel center)
Accuracy	±2 Hz (plus accuracy of the reference frequency)

Level

Range	–60 dBm to +40 dBm
Resolution	0.1 dB
Accuracy	±0.65 dB ±0.003 dB/dB (from +40 dBm to –20 dBm at +25°C) ±1.2 dB (at +10°C to +40°C)

Modulation measurement

Measurement samples	157 symbols (max.)
Burst timing range	+5, –20 symbols relative to standard offset burst timing
Accuracy	±5 µs (1/8 symbol)
EVM accuracy	±0.4% ±2% of reading
Residual EVM	< 2.8% (typical)
Residual phase error	< 1.6° (typical)
Residual magnitude error	< 1.0° (typical)
I/Q origin offset accuracy	±0.5 dB for –40 dBc (typical)

General data

External interfaces computer/control

Printer interface	Centronics (parallel), Epson/IBM compatible
Disk drive	1.44 MB, 3.5-in, PC compatible

Power requirements

Mains voltage range	85 to 264 VAC (max. 5 A)
Mains voltage frequency	47 to 440 Hz

Environmental specifications

Storage temperature	–20°C to +70°C
Operating temperature	+10°C to +40°C
Storage humidity	10% to 90% (non-condensing)
Operating humidity	10% to 75% (non-condensing)

Physical specifications

Size (h x w x d)	8 x 17.5 x 20.5 in (203 x 445 x 521 mm)
Weight	43 lb (19.5 kg)

Ordering information

Willtek 4351 Mobile Fault Finder	M 104 351 AMPS/NAMPS (Cellular 800 MHz only)
Willtek 4352-1x Mobile Fault Finder	M 104 352 AMPS/cdmaONE/CDMA2000 1xRTT (Cellular 800 MHz only)
Willtek 4353-1x Mobile Fault Finder	M 104 353 AMPS/cdmaONE/CDMA2000 1xRTT/PCS (800, 1900 MHz)
Willtek 4354 Mobile Fault Finder	M 104 354 AMPS/TDMA (Cellular 800 MHz only)
Willtek 4355 Mobile Fault Finder	M 104 355 AMPS/TDMA/PCS (800, 1900 MHz)

Note: Specifications, terms and conditions are subject to change without prior notice.

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